REMARKS

Applicant appreciates the Examiner's thorough consideration provided the present application. Claims 1-28 are now present in the application. Claims 1 and 16 have been amended. Claims 1 and 16 are independent. Reconsideration of this application, as amended, is respectfully requested.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-4, 7-16 and 19-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ise, U.S. Patent No. 5,528,267, in view of Ikeda, U.S. Patent No. 5,642,134. Claims 5, 6, 17 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ise in view of Ikeda, and further in view of Knapp, U.S. Patent No. 5,270,711. These rejections are respectfully traversed.

In light of the foregoing amendments to the claims, Applicant respectfully submits that these rejections have been obviated and/or rendered moot. As the Examiner will note, independent claim 1 and 16 have been amended to recite a combination of elements including "the substrate has a plurality of pixels, the scan lines are connected to a gate of TFT in each respective pixel, and the data lines are connected to a source of TFT in each respective pixel" and "a part of the counter electrode corresponding to a pressure is indented, the distance between the part of the counter electrode and scan line is reduced, and the distance between the part of the counter electrode and data line is reduced."

Support for the above combination of elements as set forth in claims 1 and 16 can be found in FIGs. 1, 3 and 4, and paragraphs [0026] and [0028] of the specification as originally

filed. Applicant respectfully submits that the above combinations of steps and elements as set forth in independent claims 1 and 16 are not disclosed nor suggested by the references relied on by the Examiner.

The Examiner alleged that the combination of Ise and Ikeda discloses each and every feature of claims 1 and 16. Applicant respectfully disagrees.

For the clarity purpose, several types of touch panel technology such as resistive, SAW (surface acoustic wave) and capacitive etc. are briefly introduced below. The traditional resistive touch panel is composed of two thin metallic electrically conductive and resistive layers separated by thin space. When some object touches this kind of touch panel, the layers are connected at certain point, and the panel then electrically acts similar to two voltage dividers with connected outputs. This causes a change in the electrical current which is registered as a touch event and sent to the controller for processing. The traditional SAW touch panel uses ultrasonic waves to pass over the panel. When the panel is touched, a portion of the wave is absorbed. This change in the ultrasonic waves registers the position of the touch event and sends this information to the controller for processing.

The traditional capacitive touch screen panel detects the capacitance between the panel and the external element such as a bare finger or a pen. The traditional capacitive touch screen panel is coated with a conductive material arranged in columns and rows as capacitive sensors. The human body is also an electrical device which has stored electrons, and therefore the sensors and the human body form a capacitance. When the capacitance field of the sensors is altered by another capacitance field, *i.e.,* human's finger, the detecting circuit of the panel can detect the

capacitance variation and send the information about the touch position. Capacitive sensors can either be touched with a bare finger or with a conductive device being held by a bare hand.

Independent claim 1 recites that a touch-control method of an LCD which is to sense a touch point on an LCD screen of the LCD when a pressure is applied to the LCD screen. The LCD comprising a counter electrode and a substrate having a plurality of data lines, a plurality of scan lines and a plurality of pixels, wherein the scan lines are connected to a gate of TFT in each respective pixel, and the data lines are connected to a source of TFT in each respective pixel. A part of the counter electrode corresponding to the pressure is indented, the distance between the part of the counter electrode and scan line is reduced, and the distance between the part of the counter electrode and data line is reduced. The touch-control method of an LCD includes a first touch-position sensing step, a charging step, and a second touch-position sensing step. During the idling time in-between the writing periods in which each scan line turns on sequentially to write the image data into the LCD screen, the first touch-position sensing step detects the values of liquid crystal capacitances formed between the scan lines and the counter electrode, and detects a scan-line-direction touch position (Y) according to the values of the liquid crystal capacitances formed between the scan lines needed to be detected and the counter electrode. The charging step charges a voltage signal into each of the data lines needed to be detected after the scan-line-direction touch position (Y) is detected. After the voltage signal is charged, the second touch-position sensing step detects the values of liquid crystal capacitance formed between the data lines and the counter electrode, and detects a data-line-direction touch position (X) according to the values of the liquid crystal capacitance formed between the data lines needed to be detected and the counter electrode. Accordingly, the detected scan-line-direction touch

position (Y) and the detected data-line-direction touch position (X) indicate the position of the touch point.

Independent claim 16 recites that an LCD (liquid crystal display) has a counter electrode and a substrate having a plurality of data lines, a plurality of scan lines and a plurality of pixels. The scan lines are connected to a gate of TFT in each respective pixel, and the data lines are connected to a source of TFT in each respective pixel. The LCD comprises a first sensing circuit, a timing control circuit, a voltage-signal generating circuit and a second sensing circuit. The first sensing circuit respectively electrically connects to the scan lines needed to be detected, detects values of liquid crystal capacitances formed between the scan lines needed to be detected and the counter electrode, and detects a scan-line-direction touch position according to the values of the liquid crystal capacitances formed between the scan lines needed to be detected and the counter electrode. A part of the counter electrode corresponding to a pressure is indented, the distance between the part of the counter electrode and scan line is reduced, and the distance between the part of the counter electrode and data line is reduced. The timing control circuit electrically connects to the first sensing circuit and controls the first sensing circuit to detect the liquid crystal capacitances formed between the scan lines needed to be detected and the counter electrode during idling time in-between writing periods, each of the scan lines turning on sequentially to write image data into the LCD screen in the writing periods. The voltage-signal generating circuit electrically connects to the timing control circuit and each of the data lines. The timing control circuit controls the voltage-signal generating circuit to charge a voltage signal into each of the data lines needed to be detected after the scan-line-direction touch position is detected. The second sensing circuit respectively electrically connects to each of the data lines

needed to be detected, <u>detects values of liquid crystal capacitances formed between the data lines</u> needed to be detected and the counter electrode, and detects a data-line-direction touch position according to the values of the liquid crystal capacitances formed between the data lines needed to be detected and the counter electrode after the voltage signal is charged.

In the present invention, the detected capacitance is liquid crystal capacitance formed between the scan lines and the counter electrode and liquid crystal capacitance formed between the data lines and the counter electrode. As disclosed in paragraph [0028] and FIG. 4 of the present application, when a pressure F is applied to the TFT-LCD 1, part of the counter electrode 14 corresponding to the pressure F is indented. The distance d between the counter electrode 14 and scan line 173 is reduced. Similarly, the distance between the counter electrode 14 and data line 174 is also reduced. Regarding the equation $C=\epsilon(A/d)$ showing the relationship between the capacitance of a pair of parallel conducting plates and the distance thereof, the value of the capacitance is inversely proportional to the distance between two parallel electrodes. In the equation $C=\epsilon(A/d)$, A is the surface area of the electrodes, and ϵ is a dielectric constant. In this case, when the distance d between the counter electrode 14 and scan line 173 is reduced, or the distance between the counter electrode 14 and data line 174 is reduced, the liquid crystal capacitance C_G or the liquid crystal capacitance C_D increases accordingly. Thus, if the crystal capacitance C_G corresponding to the scan line 173 or the liquid crystal capacitance C_D corresponding to the data line 174 is detected, the position of the touch point can be obtained.

For example, as shown in FIG. 1 below, it is a simplified structure of the present application, but main elements are still presented. In this structure, the user can use his/her finger to press the screen, then the counter electrode is indented and the distance between the

counter electrode and scan/data line is reduced. The position of the press point is obtained by directing detecting the capacitances formed between the counter electrode and scan/data line.

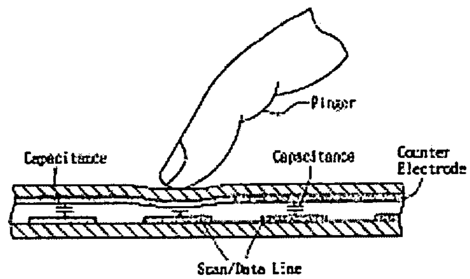

FIG. 1

Besides, data lines of LCD display have different voltage level for writing image data into pixels. In order to avoid the interference while sensing the touch point, the present application discloses two separate steps: the charging step and the second touch-position sensing step. The charging step <u>charges a voltage signal into each of the data lines needed to be detected after the scan-line-direction touch position is detected</u>. Such that the <u>data lines needed to be detected</u> have the same voltage level from the voltage signal. This feature benefits the accuracy of second touch-position sensing step. The overall detection of the present application is quite different from the traditional capacitive touch panel.

To the contrary, Ise discloses a traditional capacitive touch panel using a touch pen. The detected capacitance of Ise is the capacitance between the pen and the panel. Besides, the Examiner also acknowledges that Ise fail to teach of an LCD comprising a counter electrode that is used to detect the capacitance between the counter electrode and the scan/data lines respectively to determine a touch. Furthermore, Ise also fails to disclose that <u>a part of the</u>

counter electrode corresponding to the pressure is indented, the distance between the part of the counter electrode and scan line is reduced, and the distance between the part of the counter electrode and data line is reduced.

In addition, the Examiner considers that the scanning on the column electrodes for detection of Ise as the charging step of the present application. Applicant disagrees. Ise fails to disclose two separate steps: one charging step and one sensing step individually. Ise only discloses one step: providing scan pulse on the data lines needed to be detected while detecting column position. The residual voltages on the data lines needed to be detected affect the detection and cause lower accuracy of detection on the data lines.

Furthermore, the Examiner asserts that the row electrodes and column electrodes of Ise are corresponding to the scan lines and the data lines of the present application, and considers claims 1 and 16 of the present application lack structural limitation to define "scan lines and data lines". In fact, in col. 15, line 62 to co. 16, line 8 and FIG. 16 of Ise, it discloses that a TFT corresponding to a pixel is selected from the row electrodes y1 to yn and the column electrodes x1 to xm. Each of the row electrodes y1 to ym is connected to a source of each of TFTs in different rows (i.e., the row electrodes are data lines of the TFT liquid crystal matrix panel), while each of the column electrodes x1 to xm is connected to a gate of each of the TFTs in different columns (i.e., the column electrodes are scan lines of the TFT liquid crystal matrix panel). FIG. 17 of Ise clearly shows the COORDINATE y DETECTION MODE is performed before the COORDINATE x DETECTION MODE. In other words, Ise simply discloses that the data lines detecting step is before the scan lines detecting step. Since amended claims 1 and 16 define that the scan lines are connected to a gate of TFT in each respective pixel and the data

lines are connected to a source of TFT in each respective pixel, the row electrodes and column electrodes of Ise are quite different from the scan lines and the data lines of the present application. Ise fails to disclose detecting a data-line-direction touch position after detecting a scan-line-direction touch position.

With regard to Ikeda, the Examiner considers that Ikeda discloses an LCD comprising a counter electrode that is used to detect the capacitance between the counter electrode and the scan/data lines respectively to determine a touch. Applicant disagrees. Ikeda discloses a traditional capacitance touch panel utilizes a pen to detect the capacitance between the pen and the bus line of the panel, and col. 2, line 64 to col. 3, line 5 and FIG. 2 of Ikeda point out that the counter electrode constitutes an electrical shield member so that it may be difficult to effectively detect, by way of an electrostatic capacitive coupling, a coordinate identifying scan pulse supplied to one of the bus lines. Ikeda only illustrates the capacitance between the counter electrode and the pixel electrode and explains that the capacitance between the pen and the scan/data line is difficult to detect. Therefore, Ikeda fails to disclose the capacitance between the counter electrode and the scan/data line.

In addition, Ikeda does not disclose a force applied to the counter electrode and a part of the counter electrode corresponding to the pressure is indented. It fails to disclose that the distance between the part of the counter electrode and scan line is reduced, and that the distance between the part of the counter electrode and data line is reduced. Ikeda still fails to teach detecting the capacitance between the counter electrode and the scan/data lines. Even if Ikeda were to illustrate the capacitance between the counter electrode and the scan/data lines, Ikeda still fails to disclose the above features.

Furthermore, since Ikeda criticizes the structure illustrated in FIG. 2, one having ordinary skill in the art would not have the motivation to make the combination of Ikeda with other references.

Neither of Ise and Ikeda discloses that a part of the counter electrode corresponding to an external pressure is indented, the distance between the part of the counter electrode and scan line is reduced, and the distance between the part of the counter electrode and data line is reduced, and fail to disclose directly detecting the values of liquid crystal capacitances formed between the scan/data lines and the counter electrode. Even if one having ordinary skill in the art were to make the combination of Ise and Ikeda and invert the structure of Ikeda to avoid the shielding effect from the counter electrode, the modification should be more like the structure illustrated in FIG. 2 below. However, in this structure, the detected capacitance is the capacitance between the pen and the scan/data line, and no external pressure is applied to the counter electrode and thus the counter electrode is not indented. Accordingly, Ise and Ikeda fail to disclose these features of claims 1 and 16.

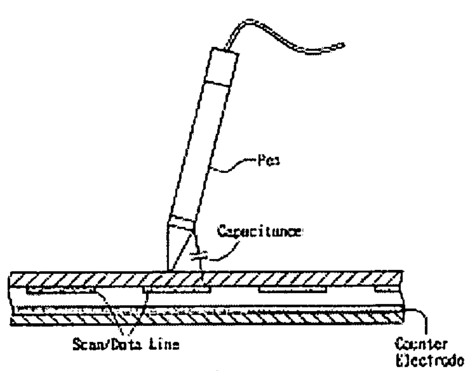

FIG. 2

With regard to the Examiner's reliance on the other secondary reference, this reference also fails to disclose the above combination of elements as set forth in independent claims 1 and 16. Accordingly, this reference fails to cure the deficiencies of Ise and Ikeda.

Accordingly, none of the references utilized by the Examiner individually or in combination teach or suggest the limitations of independent claims 1 and 16 or their dependent claims. Therefore, Applicant respectfully submits that independent claims 1 and 16 and their dependent claims clearly define over the teachings of the references relied on by the Examiner.

Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103 are respectfully requested.

CONCLUSION

Since the remaining patents cited by the Examiner have not been utilized to reject the claims, but merely to show the state of the prior art, no further comments are necessary with respect thereto.

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

In the event there are any matters remaining in this application, the Examiner is invited to contact Joe McKinney Muncy, Registration No. 32,334 at (703) 205-8000 in the Washington, D.C. area.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant respectfully petitions for a one (1) month extension of time for filing a response in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

By ______________________

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